means for identifying geographic coordinates of points on the georeferenced map that correspond to the point identified on the raster map; and

means for revising the mathematical relationship.

20. (New) The apparatus of claim 19, wherein the means for revising further comprises means for disregarding any points previously identified that are substantially inconsistent with the mathematical relationship.

REMARKS

This is in reply to the Examiner's Official Action dated October 02, 2002. Prior to this Amendment, claims 1-16 were pending. By this Amendment, the specification, and claims 1-4 and 8-16 have been amended, and claims 17-20 have been added to more appropriately describe and claim the invention. Thus, claims 1-20 are pending. The above amendment with the following remarks are submitted to be fully responsive to the Official Action. Reconsideration of this application in light of these remarks, and allowance of this application are respectfully requested.

I. Specification

Applicants have corrected minor typographical errors.

II. Rejection of Claims Under 35 U.S.C. § 102(b)

On page 2 of the Official Action, the Examiner rejected claims 1-16 under 35 U.S.C. §102(b) as anticipated by U.S. Patent No. 6,377,278 to Curtright et al. (hereinafter, Curtright).

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The present invention as recited in amended independent claim 1 is directed to a method for georeferencing a raster map image, comprising: displaying a raster map and a georeferenced map; identifying image coordinates associated with at least two points on the raster map; identifying geographic coordinates of points on the georeferenced map that correspond to the points identified on the raster map; and determining a mathematical relationship between the image coordinates and the geographic coordinates.

In contrast, Curtright discloses a method and apparatus for generating uniform digital map images that may be used to show a vehicle's location. When used in a moving map system, the map images are expected to provide the appearance of a single continuous map image as the vehicle moves from one geographic area to another. In operation, the method in Curtright first converts a printed map into a bit mapped image that can be edited by a computer (col. 3, lines 58-60.) The bit mapped image is then cropped to select a portion of the map image corresponding to a desired geographic area (e.g., a one degree longitude by one degree latitude area) (col. 4, lines 30-33.) Since latitude lines curve upward and the longitude lines taper inward, the next step is to straighten the curved latitude lines and adjust the longitude lines so that they are perpendicular to the latitude lines (col. 5, lines 7-11.) Next, the map image is resized, if necessary, (images with coordinates closer to the equator are larger than images with coordinates closer to the poles.) (col. 5, lines 19-20.) Once the individual map images are edited into geometric shapes and similarly sized, they may be logically pieced together to provide a seamless appearance as a vehicle moves from one image to the next.

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Curtright fails to disclose at least a capability to identify image coordinates associated with at least two points on the raster map; identify geographic coordinates of points on the georeferenced map that correspond to the points identified on the raster map; and determine a mathematical relationship between the image coordinates and the geographic coordinates.

In Curtright, the scanned-in map and the digital map are the same map. Therefore, there is no capability or requirement to identify image coordinates on the raster map or to determine a mathematical relationship between the image coordinates on the raster map and the geographic coordinates on the georeferenced map. Even assuming, *arguendo*, that Curtright could be modified to identify image coordinates on the raster map or to determine a mathematical relationship between the image coordinates and the geographic coordinates, the modification would not be responsive to the function sought to be performed by Curtright (i.e., to generate uniform digital map images that may be used to accurately show a vehicle's location.)

Anticipation under 35 U.S.C. §102(b) requires that each and every claim limitation be disclosed by the applied reference. Curtright does not teach each and every claim limitation of claims 1-16 and therefore, as a matter of law, cannot anticipate these claims. That is, Curtright does not teach the process of identifying image coordinates on the raster map or determining a mathematical relationship between the image coordinates and the geographic coordinates. New claims 17-18 and 19-20 depend from claims 1 and 9, respectively, and therefore are also not anticipated by Curtright.

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In the Official Action, the Examiner recognizes that many of the features claimed are not disclosed, taught, or suggested by Curtright, and he alleges that they all would have been inherent in Curtright. Applicants respectfully disagree.

To properly show that an element not disclosed in Curtright is, in fact, inherent in that reference, the Examiner should cite extrinsic evidence, such as an extra reference, that describes the inherent element. See MPEP § 2131.01(III) (8^{th} ed. 2001). "Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be recognized by persons of ordinary skill." Id. Inherency, however, may not be established by probabilities or possibilities. See MPEP § 2163.07(a).

In this case, the Examiner provides no reference or other evidentiary basis to support the inherency allegation. Even if the Examiner provided a second reference that discloses the process of identifying image coordinates on the raster map or determining a mathematical relationship between the image coordinates and the geographic coordinates, as recited in claim 1, the teachings of the second reference could not be inherent in Curtright, as would be necessary in order to establish anticipation of the subject matter of the claim, because the features of identifying image coordinates on the raster map or determining a mathematical relationship between the image coordinates and the geographic coordinates would frustrate the purpose for which Curtright was intended.

Even though the cited reference fails to reach the teachings of Applicants' device, Applicants have nevertheless amended claims 1-4 and 8-16, and added claims 17-20 to broaden the scope of the previous claims, and more appropriately describe Applicants'

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invention. Applicants contend that the claims as amended, still patentably distinguish over the prior art. Therefore, the rejection of independent claims 1 and 9 under 35 U.S.C. §102(b) as anticipated by Curtright should be withdrawn. The rejection of dependent claims 2-8 and 10-16 should also be withdrawn as they depend on allowable subject matter as recited in the respective independent claims from which they directly or indirectly depend. New claims 17-18 and 19-20 depend from allowable claims 1 and 9, respectively, and are therefore allowable as filed.

III. Claim Objections

On page 7 of the Official Action, under the heading of "Double Patenting," the Examiner objected to claims 9-16 under 37 C.F.R. § 1.75 as being a substantial duplicate of claims 1-8. It is not clear whether the Examiner is objecting to the claims under double patenting, or if the Examiner is objecting to the claims as being substantial duplicates of each other. In either event, Applicants respectfully disagree.

According to the MPEP:

> [d]ouble patenting results when the right to exclude granted by a first patent is unjustly extended by a later issued patent or patents. Before consideration can be given to the issue of double patenting, there must be some common relationship of inventorship and/or ownership of two or more patents or applications.

(emphasis added)

MPEP § 804. In this case, the Examiner has only identified the claims in the present application as being substantial duplicates of each other. Therefore, the Examiner has failed to provide sufficient information to allow Applicants to respond to a double patenting objection. Applicants therefore respectfully request that the Examiner either

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withdraw the double patenting objection or provide more information to allow the Applicants to fully respond to the objection.

If the Examiner is objecting to the claims as substantial duplicates of each other, Applicants again request additional information. In the Official Action, the Examiner provided that:

> [w]hen two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claims.

(emphasis added)

(October 2, 2002 Official Action, quoting MPEP § 706.03(k)). In this case, no claims have been allowed. The MPEP further provides that, "[c]ourt decisions have confirmed applicant's right to restate (i.e., by plural claiming) the invention in a reasonable number of ways. Indeed, a mere difference in scope between claims has been held to be enough." MPEP § 706.03(k). Here, claims 1-8 are directed to a method for georeferencing a raster map image and claims 9-16 are directed to an apparatus for georeferencing a raster map image. Since the scope of the claims are clearly distinct, and no claims have been allowed, Applicants respectfully request that the Examiner either withdraw the objection, or provide more information to allow the Applicants to fully respond to it.

In view of the foregoing, it is submitted that the cited prior art fails to teach or suggest Applicants' claimed invention. Applicants respectfully assert that the present application is in condition for allowance and request a notice to that effect.

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Applicants, therefore, request the entry of this Amendment, the Examiner's reconsideration of the application, and the timely allowance of the pending claims.

Attached hereto is a marked-up version of the changes made to the claims by this amendment. The attached page is captioned "**Version with markings to show changes made**." Deletions appear as normal text surrounded by [ ] and additions appear as underlined text.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: March 3, 2003

By: ______________________
Leonard Smith, Jr.
Reg. No. 45,118

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please amend the paragraph extending from page 13, line 17 to page 14, line 2, of the specification to read as follows:

When four or more georeferencing point-pairs are determined, the general linear georeferencing functions are over-determined. This means that more than the required amount of information to compute the general linear georeferencing functions is available, but that it is not, in general, completely consistent. The system [use] uses the extra information contained in the additional georeferencing points to provide validation checks to protect against the possibility that some of the data points may be inaccurate **(step 430)**. Points that deviate excessively with respect to a calculated standard error are presumed to be inaccurate and are omitted from the calculation of the georeferencing functions. Note that as new points are added, the system also rechecks points previously marked as inconsistent, to determine if those points should now be considered when recomputing the georeferencing functions.

Please amend the paragraph extending from page 21, line 20 to page 22, line 4, of the specification to read as follows:

These systems can be easily solved by well-known methods, such as Gaussian Elimination, or LU factorization. The solutions yield the

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desired values of $\hat{\beta}_1$, [$\hat{\beta}_1$] $\underline{\hat{\beta}_2}$, [$\hat{\beta}_1$] $\underline{\hat{\beta}_3}$, and [$\hat{\beta}_1$] $\underline{\hat{\beta}_4}$ which in turn yield the desired values for $\hat{a}_{11}$, $\hat{a}_{12}$, $\hat{a}_{21}$, $\hat{a}_{22}$, $\hat{b}_1$, and $\hat{b}_2$.

Please amend the first full paragraph on page 23 of the specification to read as follows:

Automatic Error Detection and Handling

When individual points are being assigned *x, y, Lon*, and *Lat* values, there is always a potential for error. To reduce the risk of incorrect georeferencing resulting from such errors, certain error handling procedures are built into the georeferencing process. The fundamental concept is that of detecting a "bad" point and then removing it from the set of active points, A[ ]. Note that removing a <u>bad</u> point from A will not delete the information associated with that point, but it will cause the georeferencing parameters to be completely uninfluenced by that point. We do not wish to remove the point entirely, since it may be determined at a later stage of the georeferencing, that the point was not really bad at all, and should be used in the georeferencing calculation. This will be clarified shortly.

Please amend the paragraph extending from page 23, line 21 to page 24, line 9, of the specification to read as follows:

Detecting Bad Points The following steps outline the bad point detection process using the general linear transform approach to georeferencing.

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1. Begin by placing all existing points into the active set, A.

2. If there are fewer than five active points then you are done[,]. Otherwise, for each of the currently active points in turn, move it (call it point k for the sake of convenience) temporarily out of the active set, and then calculate the resulting inverse georeferencing function (call it $\hat{g}^{(k)}$) and its corresponding SSE_k. Also, calculate the difference between the predicted value and the actual value $\delta_k = \left|\hat{g}^{(k)}(Lon_k, Lat_k) - (x_k, y_k)\right|$. Make a note of the values, $\delta_k and \delta_k / SSE_k$. Return point k to the active set (and move on to the next value of k).

Please amend the first full paragraph on page 24 of the specification to read as follows:

3. From among the results found in step 2[.], above, find the point, *k*, with the largest value of δ_k / SSE_k which also satisfies $\delta_k / SSE_k > c_1$ and $\delta_k > c_2$, where c_1 and c_2 are some constants which are set according to the general level of accuracy to be expected on the particular type of map which is being georeferenced, the current number of active points, and the dots per inch of the scanned image. If there is such a point then mark it as bad (by removing it from the active set) and return to step 2 above. Otherwise you are done.

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Please amend the paragraph extending from page 24, line 22 to page 25, line 11, of the specification to read as follows:

There are several things to note about this procedure. One is that [it] allowing the values of c_1 and c_2 to change with the number of active points, makes it possible for the georeferencing system and method to utilize points which it might originally determine bad or inconsistent after a large enough sample of points has been gathered to make it clear that a lesser level of accuracy is all that can be achieved on this map. Another observation is that by using this procedure it is impossible to reduce the number of active points down to less than four (unless you started with less than 4 in which case this procedure does not apply at all). This scheme means that as each new point is added, all points determined so far are considered, even those [which] that had previously been marked bad. Thus early "misjudgements" on the part of the system can be corrected later, in light of new point information.

Please amend the first full paragraph on page 25 of the specification to read as follows:

The same bad point detection process, can also be implemented using the rotational linear transform approach. In this case the method is capable of reducing the number of active points down to as low as three (rather than four for the general linear transform approach outlined above). This can be useful when dealing with small sets of active points.

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IN THE CLAIMS:

Please amend claims 1-4 and 8-16, as follows:

1. (Amended) A method for georeferencing a raster map image, comprising [the steps of]:

displaying a raster map and a georeferenced map;

identifying <u>image coordinates associated with</u> at least two <u>points on the raster map;</u>

<u>identifying</u> [geographically corresponding] <u>geographic coordinates of</u> points on the [raster map and on the] georeferenced map <u>that correspond to the points identified on the raster map; and</u>

[associating an image coordinate of each point on the raster map with a geographic coordinate of the corresponding point on the georeferenced map;]

determining a [functional] <u>mathematical</u> relationship between the image coordinates and the geographic coordinates[; and

thereafter, for each additional corresponding points identified on the raster map and the georeferenced map,

revising the functional relationship between the image coordinates and the geographic coordinates according to the additional corresponding points, and

disregarding any points which are substantially inconsistent with the functional relationship].

2. (Amended) The method of claim 1, further comprising [the step of]:

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using the [functional] mathematical relationship to determine the geographic coordinates of [features] at least one feature on the raster map.

3. (Amended) The method of claim 1, further comprising [the step of]:

storing the [functional] mathematical relationship with the raster map.

4. (Amended) The method of claim 1, further comprising [the step of]:

[when] manipulating the raster map to display a location on the raster map [is manipulated by a user,]; and

updating the display of [manipulating] the georeferenced map [accordingly] to display a location identical to the location displayed on the raster map.

8. (Amended) The method of claim 1, wherein the [functional] mathematical relationship is represented by a set of general linear functions.

9. (Amended) [A computer system, having at least a processor connected to communicate with a readable and writeable memory] An apparatus for georeferencing a raster map image, comprising:

means for displaying a raster map and a georeferenced map;

means for identifying image coordinates associated with at least two points on the raster map;

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means for identifying [geographically corresponding] geographic coordinates of points on the [raster map and on the] georeferenced map that correspond to the points identified on the raster map; and

[means for associating an image coordinate of the each point on the raster map with a geographic coordinate of the corresponding point on the georeferenced map;]

means for determining a [functional] mathematical relationship between the image coordinates and the geographic coordinates[; and

for each additional corresponding points identified on the raster map and the georeferenced map,

means for revising the functional relationship between the image coordinates and the geographic coordinates according to the additional corresponding points, and means for disregarding any points which are substantially inconsistent with the functional relationship].

10. (Amended) The [system] apparatus of claim 9, further comprising:

means for using the [functional] mathematical relationship to determine the geographic coordinates [to features] of at least one feature on the raster map.

11. (Amended) The system of claim 9, further comprising:

means for storing the [functional] mathematical relationship with the raster map.

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12. (Amended) The [system] apparatus of claim 9, further comprising:

means for manipulating[, when] the raster map to display a location on the raster map [is manipulated by a user,]; and

means for updating the display of [manipulating] the georeferenced map [accordingly] to display a location identical to the location displayed on the raster map.

13. (Amended) The [system] apparatus of claim 9, wherein the geographic coordinates are latitude and longitude.

14. (Amended) The [system] apparatus of claim 9, wherein the raster map and the georeferenced map are displayed on the same computer display.

15. (Amended) The [system] apparatus of claim 9, wherein the corresponding points are marked by a user after visually determining geographically corresponding points.

16. (Amended) The [system] apparatus of claim 9, wherein the [functional] mathematical relationship is represented by a set of general linear functions.

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